Flow structure and heat transfer induced by embedded vorticity

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Résumé en anglais	Several vortex generator shapes are used to increase heat and mass transfer in open and internal flows. Here we report a three-dimensional numerical study investigating the effects of longitudinal and transverse vortices on the heat and mass transfer mechanisms generated by rows of trapezoidal vortex generators. The turbulent macrostructures of these streamwise vortices appear greatly to enhance radial convective transfer. Due to Kelvin–Helmholtz instability, the shear layer shed from the tab's edge becomes unstable and generates periodic transverse vortices that enhance fluid mixing and heat transfer. A global performance analysis of the high-efficiency vortex (HEV) heat exchanger designed to exploit these embedded vortices, shows that the HEV is very competitive with other multifunctional heat exchangers/reactors, especially due to its very low energy consumption.
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